Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 – 34 (withdrawn)

35. (original) A fluid separation control system comprising:

pumps for moving fluid through said system;

a fluid pressure monitoring device for sensing fluid pressures in said system and generating pressure signals in response to said sensed pressures;

a processor for receiving said pressure signals and generating alarm-triggering signals in response thereto;

an audible and/or visible alarm triggered by said alarm-triggering signals; and

a flow controller triggered by said alarm-triggering signals;

wherein said processor is programmed to compare said sensed pressures with system pressures and generate a first-level alarm-triggering signal when said sensed pressures are less than or equal to a first-level alarm-triggering sensor pressure;

wherein said first-level alarm-triggering signal causes said flow controller to pause fluid flow in some of said pumps for a specified delay time;

wherein said processor is programmed to count the number of first-level alarm-triggering signals generated within a specified period and generate a second-level alarm-triggering signal when a specified number of such first-level alarm-triggering signals have been generated within said specified period; and

wherein said second-level alarm-triggering signal causes said flow controller to slow down fluid flow rate in said system.

36. (original) The control system of claim 35 wherein said alarm responds to said first-level alarm-triggering signal by sounding an audible alarm and/or displaying a visible alarm.

37. (original) The control system of claim 35 wherein said alarm responds to said second-level alarm-triggering signal by continuously sounding an audible alarm and/or continuously displaying a visible alarm.

38. (previously presented) The fluid separation control system of claim 35 wherein said processor is programmed to calculate said first-level alarm-triggering sensor pressure using a specified system pressure and selected system parameters.

39. (previously presented) The fluid separation control system of claim 38 designed to control a blood apheresis system, wherein said system parameters comprise the hematocrit in the tubing line, the flow rate in the inlet line, the flow rate in the needle, and the hematocrit in the needle.

40. (previously presented) The fluid separation control system of claim 39 wherein said processor is programmed to calculate said calculated first-level alarm-triggering pressure using the following formula:

$$P_{1st\ level\ alarm} = Config + 75 - 0.3309 * Q_{in}/(1-H_{in}) - 0.3026 * Q_n/(1-H_n);$$

wherein $P_{1st\ level\ alarm}$ is the first level alarm-triggering sensor pressure; Config is a configuration specified system pressure (mmHg), Q_{in} is the flow rate in the inlet tubing line (ml/min.); H_{in} is the Hematocrit in the inlet tubing line; Q_n is the flow rate in the needle (ml/min.); and H_n is the Hematocrit in the needle.

41. (previously presented) The fluid separation control system of claim 38 wherein said specified system pressure is between about -100 and -250 mmHg.

42. (original) The control system of claim 35 wherein said processor is programmed to compare said sensed pressures with a selected first-level alarm-disabling pressure.

43. (previously presented) The control system of claim 42 wherein said processor is programmed to generate a first-level alarm-disabling signal if the sensed pressure rises to a value greater than or equal to a specified first-level alarm-disabling sensor pressure within the specified delay time; and

wherein the flow controller responds to said first-level alarm-disabling signal by causing pumps which were paused to resume pumping.

44. (original) The control system of claim 42 wherein said processor is programmed to calculate said first-level alarm-disabling pressure using a specified alarm-disabling system pressure and selected system parameters.

45. (original) The control system of claim 44 wherein said specified alarm-disabling system pressure is between about 0 and about -150 mmHg.

46. (original) The control system of claim 44 wherein said specified alarm-disabling system pressure is about -50 mmHg.

47. (original) The control system of claim 43 wherein said alarm responds to said first-level alarm-disabling signal by stopping sounding and/or displaying the alarm.

48. (original) The control system of claim 43 wherein said processor is programmed to generate a third-level alarm-triggering signal if the sensed pressure does not rise to a value greater than or equal than the specified first-level alarm-disabling sensor pressure within the specified delay time; and

wherein the flow controller responds to said third-level alarm-triggering signal by shutting down all pumps in the system.

49. (original) The control system of claim 48 wherein said alarm responds to said third-level alarm-triggering signal by sounding an audible alarm and/or displaying a visible alarm.

50. (original) The control system of claim 35 wherein said specified number of first-level alarm-triggering signals is between about two and about five.

51. (original) The control system of claim 50 wherein said specified number of first-level alarm-triggering signals is about three.

52. (original) The control system of claim 35 wherein said specified delay time is between about 2 and about 6 seconds.

53. (original) The control system of claim 52 wherein said specified delay time is about 5 seconds.

54. (original) The control system of claim 39 wherein said blood apheresis system comprises a leukocyte reduction chamber.

55. (previously presented) The control system of claim 54 wherein said flow controller does not pause fluid flow through said leukocyte reduction chamber in response to said first-level alarm-triggering signal.

56. (original) The control system of claim 35 wherein said flow controller slows said flow rate in response to said second-level alarm-triggering signal to a rate low enough to prevent triggering a further first-level alarm condition.

57. (original) The control system of claim 35 wherein said flow controller slows said rate to about one-half normal rate.

58. (original) The control system of claim 35 wherein said flow controller maintains said reduced flow rate until an operator operates said flow controller to return said flow rate to normal or to shut down all of said pumps.

59. (original) The control system of claim 35 wherein said specified period is between about 1 and about 10 minutes.

60. (original) The control system of claim 35 wherein said specified period is about five minutes.

61. (original) The control system of claim 35 also comprising a process monitor for assessing completeness of collection of platelets and plasma; said processor being in signal communication with said process monitor, and being programmed to trigger a second-level alarm condition only if collection of platelets and plasma is incomplete.

Claims 62-68 (Withdrawn)

69. (new) A fluid separation control system for a blood apheresis system, said apheresis system having a leukocyte reduction chamber for fluidized-bed separation of blood components, said control system comprising:
pumps for moving fluid through said system including said leukocyte reduction chamber;

a fluid pressure monitoring device for sensing fluid pressures in said system and generating pressure signals in response to said sensed pressures;

a processor for receiving said pressure signals and generating alarm-triggering signals in response thereto;

a flow controller triggered by said alarm-triggering signals;

wherein said processor is programmed to compare said sensed pressures with system pressures and generate a first-level alarm-triggering signal when said sensed pressures are less than or equal to a first-level alarm-triggering sensor pressure;

wherein said first-level alarm-triggering signal causes said flow controller to pause fluid flow in some of said pumps for a specified delay time while maintaining flow in said leukocyte reduction chamber; wherein said processor is programmed to count the number of first-level alarm-triggering signals generated within a specified period and generate a second-level alarm-triggering signal when a specified number of such first-level alarm-triggering signals have been generated within said specified period; and wherein said second-level alarm-triggering signal causes said flow controller to slow down fluid flow rate in said system and maintaining flow in said leukocyte reduction chamber.

70. (new) The fluid separation control system of claim 69 wherein said processor is programmed to generate a third-level alarm-triggering signal instead of said second-level alarm-triggering signal if a plasma or platelet collection procedure has been completed.

71. (new) The fluid separation control system of claim 70 wherein said third-level alarm-triggering signal stops all pumps.

72. (new) The fluid separation control system of claim 69 wherein said processor is programmed to generate a third-level alarm-triggering signal if said sensed pressures are less than or equal to a first-level alarm-triggering sensor pressure while said second-level alarm-triggering signal is in effect

73. (new) The fluid separation control system of claim 72 wherein said third-level alarm-triggering signal stops all pumps.

74. (new) The fluid separation control system of claim 69 wherein said first-level alarm-triggering signal pauses all pumps except a platelet pump which maintains flow through said leukocyte reduction chamber.

75. (new) The fluid separation control system of claim 69 wherein said second-level alarm triggering signal causes flow through an inlet pump and an anticoagulant pump to be reduced by a specified flow-reduction factor, while maintaining flow through said leukocyte reduction chamber.

76. (new) The fluid separation control system of claim 75 wherein said specified flow-reduction factor is low enough to cause sensed pressures to fall below said first-level alarm-triggering sensor pressure but high enough to maintain flow through said leukocyte reduction chamber.

77. (new) The fluid separation control system of claim 77 wherein said specified flow-reduction factor is 0.5.